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Retaining the Results - An Overview of Orthodontic Retainers

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Abstract

One of the greatest challenges that an orthodontist faces is to retain the changes achieved after active phase of the orthodontic treatment concludes. Orthodontic Retainers are passive appliances that are given to the patients after active phase of orthodontic therapy in order to maintain, retain and stabilize the teeth at their corrected positions by reorganization of the supporting structures. This article aims to provide an overview of commonly used orthodontic retainers in order to aid in planning of retention, specific to every patient.

Keywords: retainers, relapse, stability, retention, malocclusion

Introduction

Retention is one of the most controversial topic of modern orthodontics with the only thing being certain is uncertainty [1]. Retention is considered to be one of the most important aspects of orthodontic treatment. Angle once stated that "The problem involved in retention is so great as to test the utmost skill of the most competent orthodontist, often being greater than the difficulties being encountered in the treatment of the case up to this point."[2]

Retention is referred to be the post active orthodontic treatment phase that maintains the teeth in their orthodontic ally corrected positions by means of retentive appliances. And the tendency of the teeth to move back to their pre treatment position from their post-treatment desired positions is termed as relapse. However, stability is a condition of maintaining the equilibrium. Relapse to its maximum extent is believed to occur in the first two years post treatment, as reported by various studies [3, 4]. Thus, orthodontic retainers resist the tendency of relapse of corrected malocclusions under the influence of occlusal, periodontal and soft tissue forces and continuing dent facial growth. This article gives an overview of various types of retainers available as a choice for specific malocclusions, to aid in making the best possible retention plan for each patient.

Retention

Orthodontic treatment results are potentially unstable and thus retention is necessary for the following three reasons;

1. For reorganization of gingival and periodontal fibres affected by orthodontic tooth movement.
2. Growth induced changes may alter the orthodontic treatment results.
3. Soft tissues pressure over inherently unstable positioned teeth post treatment, constantly produce relapse tendency.

Following orthodontic treatment, the occlusion may be self-retentive, but the use of retainers should be advocated to avoid any chances of relapse. Retention planning, based on type of treatment can thus be categorized into 3 types- short term or limited, moderate and prolonged or permanent retention.[2,4] Table 1 summarize the different types of retention and the type of retainers indicated in specific type of malocclusions.

Retainers

Retainers are orthodontic appliances that may be fixed or removable or combination of both and are used to retain the teeth passively at their corrected positions or bring about limited active tooth movement after the active phase of orthodontic treatment. Retainers can be classified as shown in Table 2.

Criteria for Ideal Retainer:

According to Graber [6] an ideal retainer must fulfil the following criteria;

- ✓ Should retain all teeth at their desired corrected positions.
- ✓ Should facilitate normal functional forces to act freely on the dentition.
- ✓ Design should promote self cleansing.
- ✓ Oral hygiene maintenance should be easily permitted with its use.
- ✓ Should have adequate strength to bear the rigors of day to day usage.

Removable Retainers

Removable retainers can be removed and reinserted by the patient and are most commonly used type of retainers.

1. **Hawley's Retainer:** Most Frequently Used Retainer, Was Introduced In 1920 By Charles Hawley. It Consists Of A Short Labial Bow With Molar Clasps Embedded In An Acrylic Base. It Can Be Used Both Passively As Well As For Limited Active Tooth Movements.[7]

2. Begg's Retainer: It Consists Of A Wire Running Along The Labial Surface Of All Teeth Up to The Last Erupted Molar And Curves Around It To Get Embedded In Acrylic That Spans The Palate. Is The Retainer Of Choice For Most Of The Cases As It Does Not Have Any Crossover Wire Extending Between Cuspid And Bicuspid Thus Giving An Advantage Of Reduced Risk Of Space Opening.[8]

3. Wrap Around Or Clip-On Retainer: Second Most Commonly Used Type Consisting Of Wire That Passes Along The Labial As Well As Lingual Surfaces Of All Erupted Teeth Which Is Embedded In A Strip Of Acrylic. A Variant of the Wrap around Retainer, a Canine-To-Canine Clip-On Retainer, Is Widely Used In the Lower Anterior Region [9]

1. Essix Retainer: Essix Retainers Are A Type Of Vacuum Formed Retainers That Are Clear, Thinner But Stronger Than The Cuspid To Cuspid Version Of Full Arch Vacuum Formed Retainers. It Is Quite Versatile As Can Also Serve As Temporary Bridge, Bite Plane And Night Guard For Bruxism. Possible Telephonic Supervision And Patient Compliance Helps In Providing True Permanent Retention.[6]

2. **Kesling Tooth Positioner:** Kesling Tooth Positioner Is Made In A Way That It Covers All The Tooth Surface Of Maxillary And Mandibular Teeth And Also A Small Portion Of Gingiva. It Spans Over the Inter Occlusal Space and Is Fabricated Using Thermoplastic Ruber Like Material. It Is Durable And Doesnt Need Activation At Regular Intervals. The Main Drawbacks: Are Difficulty In Speech And High Risk Of Tmj Problems.[10]

3. **Invisible Retainer:** It Is A Type Of Tooth And Tissue Borne Retainer Covering A Part Of Gingival Tissue And The Clinical Crown Completely. It Is Made Using A Biostar Machine That Fabricates An Ultra Thin Transparent Retainer Out Of Thermoplastic Sheets. It Is Esthetic And Highly Popular Due To Its Invisible Form [11]

4. **Crozat Retainer:** A 4-4 Crozat Appliance Consists Of A Labial Bow, Lingual Finger Springs Which Are Recurved And Double Lapped Along With Cribs On The First Bicuspids. It Is Removable And Esthetic, Thus Provides Firm Retention, Labiolingual Control Of Anterior Teeth, Flexibility, Maintenance Of Adequate Oral Hygiene. Drawbacks - Cost Effective And Breakable[12]

5. **Vander Linden Retainer:** This Type Of Retainer Offers Complete Control Over The Maxillary Anterior Teeth, With Clasps On The Cuspids Providing Firm Fixation. This Retainer Does Not Usually Interfere With The Occlusion.[13]

6. **Kansals Retainer:** It Is A Tooth Borne Orthodontic Retainer Made Using A Modified Labial Bow, Kansals Bow And Pin Head Clasps Between The Bicuspids And Molars Embedded In An Acrylic Base. The Main Advantage Of This Retainer Is That It Is Less Bulky, Low Food Accumulation And Easy To Clean.[14]

7. Osamu Invisible Retainer: It Is A Retainer Made Up Of Thin Thermoplastic Sheets. They Extend From The Clinical Crowns Of The Teeth To The Part Of The Adjacent Gingiva[15]

Fixed Retainers

Fixed retainers, as the name suggests are fixed over the lingual surface of teeth either by banding the adjacent tooth or by bonding it. Fixed retainers were first introduced for the means of orthodontic retention by Kneirim in 1973.17 it is indicated where prolonged retention is required and involves minimal or no patient cooperation. They are thus a type of invisible retainers and thus advantageous to use with patients having esthetic concerns.

1. Band and Spur Retainers:

It Is Commonly Used For Retention In Cases With Single Tooth Rotations Or Labiolingual Displacements. The Corrected Ectopic Tooth Is Banded And Spurs Are Soldered Onto The Bands In Order To Overlap The Adjacent Teeth.

2. **Banded Canine To Canine Retainers:** Similar To Lingual Bonded Retainer As A Thick Wire Is Contoured Along The Lingual Surface Of Anterior Teeth And Is Soldered Over The Bands Placed Over The Canines. It Is Most Commonly Used For Retention In Lower Anterior Region.

3. **Bonded Lingual Retainers:** Bonded Lingual Retainers Are One Of The Most Commonly Used Types. It Makes Use of Multistranded Wires That Are Adapted Along The Lingual Curvature Of Anterior Teeth And Bonded Over The Canines.16

The Evolution of Fixed Lingual Retainers Can Be Broadly Classified Into Five Generations [25];

1st Generation: Fixed Retainers Made Of 0.025–0.036 Inch Blue Elgiloy Or Stainless Steel Round

Wires. These Are Bonded Only To Lingual Surfaces of Canines, And Loops Are Bended At Each End To Increase Retention. [18]

2nd Generation: Fixed Retainers Made Of Highly Elastic 0.032 Inch Triple-Stranded Wires and Can Be Bonded To Lingual Surfaces of All Anterior Teeth. [19]

3rd Generation: Retainers Made Of 0.032 Inch Stainless Steel Or 0.030 Inch Gold-Coated Plain Wires That Are Sandblasted At The Ends Using Aluminium Oxide In Order To Achieve Maximum Mechanical Retention. They Are Bonded To Canines Only. [20]

4th Generation: Fixed Retainers Made Of 0.0215 Inch 5-Stranded Wires That Can Be Bonded To All Anterior Teeth. [21, 22]

5th Generation: Retainers Using 0.032 Inch, Blue Elgiloy Plain Wires That Are Sandblasted At The Ends And Bonded To Canines Only. [23] Table 3 And Table 4 Summarizes Various Advantages And Disadvantages Of Using Removable And Fixed Retainers Respectively.

Conclusion

As an orthodontist, one should begin with the end in mind. The type of retainer, the technique of fabrication, different material to bond, and retention protocol should be carefully considered at the beginning of orthodontic treatment. This will ensure an excellent long-term stability and retention for the treatment. From the literature reviewed in this article, we can conclude that for the cases requiring limited retention, removable retainers are the choice of appliance and also they are best accepted in the maxillary arch. However, in cases where permanent or prolonged retention is a must, a fixed retainer is still the best choice. The patients should therefore be prepared for indefinite retention, irrespective of the appliance used, following the active orthodontic treatment in order to have stable results throughout.

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